

2014 Edition

ROHM GROUP  
**LAPIS**  
SEMICONDUCTOR

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ROHM GROUP

# Memory Catalog

DRAM / EEPROM / FeRAM / NOR Flash / P2ROM™



The ROHM Group offers a variety of memory products, from DRAM to proprietary non-volatile types, to suit a wide range of market and customer needs.

Industry-leading quality and reliability  
**DRAM**

High rewrite transfer rate with excellent data retention characteristics  
**NOR Flash**

Reliable quality • Stable supply  
**FeRAM**

Short lead time • Eliminates customer stock  
**P2ROM™\***

(\*)P2ROM™ (Production Programmed ROM)

Market-proven reliability and performance  
**EEPROM**





ROHM GROUP

# Memory Products

## Volatile Memory

### DRAM

P.03

FP/EDO [4Mb/16Mb/64Mb,5V/3.3V]

SDRAM [16Mb-256Mb,3.3V]

SDRAM series for SiP (Chips)

Video memory series [3Mb,4Mb,5Mb,6Mb,10Mb,26Mb,5V/3.3V]

## Non-Volatile Memory

### EEPROM

P.07

I<sup>2</sup>C BUS (2-Wire)

Microwire BUS (3-Wire)

SPI BUS

Ultra-Compact WL-CSP

Plug & Play EEPROM

### FeRAM

P.13

Parallel BUS FeRAM [256Kb,3.3V]

I<sup>2</sup>C BUS FeRAM [64Kb,3.3V]

SPI BUS FeRAM [32Kb-2Mb,3.3V]

### NOR Flash

P.13

Parallel BUS NOR Flash [32Mb-256Mb,3.3V]

### P2ROM™

P.15

Parallel BUS Standard P2ROM™ [8Mb-512Mb,3.3V]

Parallel BUS Page Mode P2ROM™ [16Mb-16Gb,3.3V]

SPI BUS P2ROM™ [16Mb-128Mb,3.3V]

AS@P2ROM™ Series with Built-In Gate Array

# DRAM Series lineup

## Broad lineup of DRAM

[Density] bit

	4M	16M	64M	128M	256M
<b>DRAM FP/EDO Series</b> Asynchronous clock High speed EDO Cu frame Stable supply Automotive grade Low power Standard package	MSM514xxxx Series MSM5416258B Series MSM51V4xxxx Series MSM54V16258B Series MSM514400xP Series MSM514260EP Series MSM51V4xxxP Series MSM54V16258BP Series <b>37 models</b>	MSM511xxxx Series MSM51V1xxxx Series MSM511816xFP Series MSM51V1xxxxP Series <b>32 models</b>	MD51V65165E Series <b>2 models</b>		
<b>SDRAM Series</b> Synchronous clock Broad temp. range Adjustable driveability 166MHz operation Stable supply Automotive grade JEDEC-compliant Cu frame No damping resistor required		MSM56V16800F Series MSM56V16160x Series MSM56V16160xP Series <b>12 models</b>	MD56V62xxxx Series MD56V62xxx-xxTAP Series MD56V62160M-xxTAP Series <b>9 models</b>	MD56V72160C Series MD56V72160C-xxTAP Series <b>8 models</b>	MD56V82160A Series MD56V82160A-xxTAP Series MD58W82160A Series(DDR) <b>11 models</b>
<b>SDRAM Series for SiP</b> Chip products 16Mbit Min. chip size SIP failure analysis Chip traceability 166MHz operation 100% KGD Automotive grade Testing program available Assembly solutions		MSM56V16160K Series <b>4 models</b>	MD56V62160M Series <b>5 models</b>	MD56V72160C Series <b>4 models</b>	
<b>Application</b> Car Equipment Industrial Equipment PC, games, Communication devices AV Equipment					

## Wide lineup of video memory

[Density] bit

	3M	4M	5M/6M	10M	26M
<b>Video memory Series</b> FIFO Input/output clock rate control Automotive grade Write mask function Selectable top address Asynchronous input/output clock Self-refresh included 2-port dual clock Cascade function	MSM5412222B Series MSM54V12222B Series MS81V03120 Series <b>6 models</b>	MS8104160A Series MS81V04160A Series MS81V04166A Series MS81V04160AP Series <b>8 models</b>	MS81V05200-13TAZ03 MS81V06160 Series <b>3 models</b>	MS81V10160 Series <b>2 models</b>	MS81V26000 Series MS81V26000-25TPZP3 <b>3 models</b>
<b>Application</b> AV/Car Equipment Industrial Equipment Panel size					
	VGA / WVGA			XGA	
	NTSC / PAL			Half HD	Full HD

## FP/EDO Series

### Stable supply · Broad product lineup

FP(Fast Page) and EDO(Extended Data Out) DRAMs are CMOS asynchronous clock types.  
A wide selection of compatible types are offered to suit various needs.

Orders require the complete part number, including the access time and package type.

Power supply voltage	Memory density	Number of data bits	Refresh cycle	Function/Part No.	Function/Part No.	Access time	Other features	Package		
5V	4Mb	x4	1K	FP	MSM514400E	t <sub>AC</sub> 60ns	Cu	TSOP(II)26/20		
		x8	1K	FP	MSM514800E	t <sub>AC</sub> 60ns		TSOP(II)28		
		x16	512	FP	MSM514800ESL	t <sub>AC</sub> 60ns	LOW POWER	TSOP(II)28		
		x16	512	FP	MSM514260E	t <sub>AC</sub> 60ns		TSOP(II)44/40		
	3.3V	4Mb	x4	4K	FP	MSM5116400F	t <sub>AC</sub> 60ns	Cu	TSOP(II)26/24	
			x8	2K	FP	MSM5117400F	t <sub>AC</sub> 50ns		TSOP(II)26/24	
			x8	2K	FP	MSM5117800F	t <sub>AC</sub> 60ns		TSOP(II)28	
			x16	4K	FP	MSM5116160F	t <sub>AC</sub> 60ns		TSOP(II)50/44	
		3.3V	16Mb	x4	1K	FP	MSM5118160F	t <sub>AC</sub> 50ns		TSOP(II)50/44
				x8	1K	FP	MSM5118160F	t <sub>AC</sub> 50ns		TSOP(II)50/44
x8				1K	FP	MSM51V4400E	t <sub>AC</sub> 70ns		TSOP(II)26/20	
x8				1K	FP	MSM51V4800E	t <sub>AC</sub> 70ns		TSOP(II)28	
3.3V			4Mb	x16	512	EDO	MSM54V16258B	t <sub>AC</sub> 40ns		TSOP(II)44/40
				x16	512	EDO	MSM54V16258BSL	t <sub>AC</sub> 40ns	LOW POWER	TSOP(II)44/40
	x16			512	EDO	MSM51V4265E	t <sub>AC</sub> 60ns		TSOP(II)44/40	
	x16			512	FP	MSM51V16400F	t <sub>AC</sub> 60ns		TSOP(II)26/24	
	3.3V		16Mb	x4	4K	EDO	MSM51V16405F	t <sub>AC</sub> 50ns		TSOP(II)26/24
				x4	2K	FP	MSM51V17400F	t <sub>AC</sub> 50ns		TSOP(II)26/24
		x8		2K	EDO	MSM51V17405F	t <sub>AC</sub> 50ns		TSOP(II)26/24	
		x8		2K	EDO	MSM51V17805F	t <sub>AC</sub> 60ns		TSOP(II)28	
		3.3V	16Mb	x8	4K	FP	MSM51V16160F	t <sub>AC</sub> 50ns		TSOP(II)50/44
				x8	4K	EDO	MSM51V16165F	t <sub>AC</sub> 60ns		TSOP(II)50/44
x16				1K	FP	MSM51V18160F	t <sub>AC</sub> 50ns		TSOP(II)50/44	
x16				1K	EDO	MSM51V18165F	t <sub>AC</sub> 50ns		TSOP(II)50/44	
64Mb			x4	4K	EDO	MD51V65165E	t <sub>AC</sub> 50ns		TSOP(II)50	

Power supply voltage	Memory density	Number of data bits	Refresh cycle	Function/Part No.	Function/Part No.	Access time	Other features	Package
5V	4Mb	x4	1K	FP	MSM514400DP/EP	t <sub>AC</sub> 60ns	Cu	TSOP(II)26/20
		x16	512	FP	MSM514260EP	t <sub>AC</sub> 60ns		TSOP(II)44/40
		x16	1K	FP	MSM5118160FP	t <sub>AC</sub> 60ns		TSOP(II)50/44
3.3V	4Mb	x4	1K	FP	MSM51V4400EP	t <sub>AC</sub> 70ns		TSOP(II)26/20
		x16	512	EDO	MSM54V16258BP	t <sub>AC</sub> 40ns		TSOP(II)44/40
		x16	512	EDO	MSM51V4265EP	t <sub>AC</sub> 60ns		TSOP(II)44/40
	16Mb	x4	2K	FP	MSM51V17400FP	t <sub>AC</sub> 60ns		TSOP(II)26/24
		x16	1K	EDO	MSM51V18165FP	t <sub>AC</sub> 60ns		TSOP(II)50/44

FP DRAM function type  
 EDO High speed EDO access function  
 LOW POWER Low power consumption for Refresh  
 t<sub>AC</sub> 28ns Access time  
 t<sub>AC</sub> 100ns Access time  
 Cu Cu frame  
 Operating temperature: 0°C, +70°C, +85°C, +105°C

Pin-Compatible Packages

I/O Density	x4bit		x8bit	x16bit		
	4Mbit	16Mbit	4Mbit / 16Mbit	4Mbit	16Mbit	64Mbit
Flat type (H=1.27mm) TOP	300mill 1.27mm pitch	300mill 1.27mm pitch	400mill 1.27mm pitch	400mill 0.8mm pitch	400mill 0.8mm pitch	400mill 0.8mm pitch
	TSOP(II)26/20	TSOP(II)26/24	TSOP(II)28	TSOP(II)44/40	TSOP(II)50/44	TSOP(II)50

\*Actual size shown

## SDRAM Series

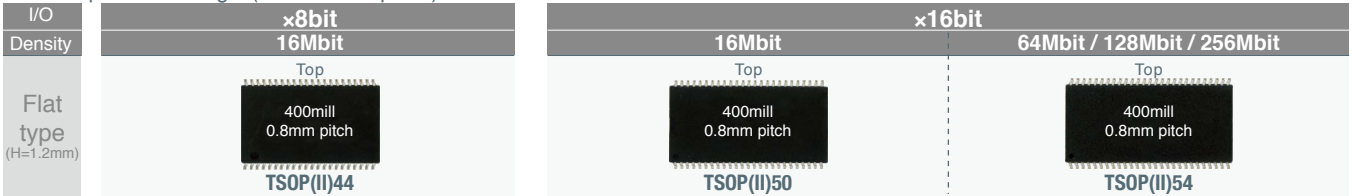
### Stable supply

SDRAM is a synchronous type of DRAM.  
Our multiple fab locations ensure stable supply around the world.

Standard				Orders require the complete part number, access time and package type. Note : Cycle time is applied to xx.										
Power supply voltage	Memory density	Number of data bits	Refresh cycle	Function/Part No.	Max. frequency	Cycle time			Other features			Package		
3.3V	16Mb	x8	4K	SDR	125 MHz	CLK 8ns	CLK 10ns				0°C to +70°C	TSOP(II)44		
				SDR	125 MHz	CLK 8ns	CLK 10ns				0°C to +70°C	TSOP(II)50		
3.3V	64Mb	x16	4K	SDR	143 MHz	CLK 7ns	CLK 7.5ns	CLK 8ns	CLK 10ns	Cu frame	DRIVER CONTROL	0°C to +70°C	TSOP(II)50	
				SDR	100 MHz	CLK 10ns					0°C to +70°C	TSOP(II)54		
3.3V	128Mb	x16	4K	SDR	143 MHz	CLK 7ns	CLK 7.5ns	CLK 8ns	CLK 10ns	Cu frame	DRIVER CONTROL	HALO GEN FREE	0°C to +70°C	TSOP(II)54
				SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns	Cu frame	DRIVER CONTROL	HALO GEN FREE	0°C to +70°C	TSOP(II)54
2.5V	256Mb	x16	8K	SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns	Cu frame	DRIVER CONTROL	HALO GEN FREE	0°C to +70°C	TSOP(II)54
				DDR	200 MHz	CLK 5ns	CLK 6ns	CLK 10ns			HALO GEN FREE	0°C to +70°C	TSOP(II)66	
<b>Automotive Grade</b>														
3.3V	16Mb	x16	4K	SDR	100 MHz				CLK 10ns			-40°C to +85°C	TSOP(II)50	
				SDR	166 MHz	CLK 6ns			CLK 8ns	CLK 10ns	Cu frame	DRIVER CONTROL	-40°C to +85°C	TSOP(II)50
3.3V	64Mb	x16	4K	SDR	100 MHz				CLK 10ns			-40°C to +85°C	TSOP(II)54	
				SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns	Cu frame	DRIVER CONTROL	HALO GEN FREE	-40°C to +85°C	TSOP(II)54
3.3V	128Mb	x16	4K	SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns	Cu frame	DRIVER CONTROL	HALO GEN FREE	-40°C to +85°C	TSOP(II)54
				SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns	Cu frame	DRIVER CONTROL	HALO GEN FREE	-40°C to +85°C	TSOP(II)54
3.3V	256Mb	x16	8K	SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns	Cu frame	DRIVER CONTROL	HALO GEN FREE	-40°C to +85°C	TSOP(II)54
				SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns	Cu frame	DRIVER CONTROL	HALO GEN FREE	-40°C to +85°C	TSOP(II)54

Icon Descriptions: SDR, DDR, DRAM function type, HALO GEN FREE, HALOGEN FREE, 100 MHz to 200 MHz Max. operating frequency (MHz), 0°C to +70°C to -40°C to +85°C Operating temperature, CLK 5ns to CLK 10ns Cycle time, Cu frame, DRIVER CONTROL, Drivability control function.

### Pin-Compatible Packages (JEDEC-Compliant)



\*JEDEC (JEDEC Solid State Technology Association) is a semiconductor engineering trade organization and standardization body

## SDRAM Series for SiP (Chips)

### Stable supply • KGD

We offer KGD DRAM chips in the form of wafers, featuring quality equivalent to package products, for use in SiP (System in Package) applications.

\*All SDRAM products for SiP utilize custom part numbers.

Standard														
Power supply voltage	Memory density	Number of data bits	Refresh cycle	Function/Part No.	Max. frequency	Cycle time			Other features					
3.3V	16Mb	x16	4K	SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns			-40°C to +25°C	KGD	
				SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 8ns	CLK 10ns			-40°C to +25°C	KGD
				SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns				-40°C to +25°C	KGD
<b>Automotive Grade</b>														
3.3V	16Mb	x16	4K	SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns			-40°C to +25°C	KGD	
				SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 8ns	CLK 10ns			-40°C to +25°C	KGD
				SDR	166 MHz	CLK 6ns	CLK 7ns	CLK 7.5ns	CLK 10ns				-40°C to +25°C	KGD

Icon Descriptions: SDR, DRAM function type, 166 MHz Max. operating frequency, CLK 6ns to CLK 10ns Cycle time, -40°C to +25°C Operating temperature, KGD KGD ensured

## Stable supply · Broad lineup

# Video memory Series

LAPIS Semiconductor's video memory products were developed using DRAM technology. A diverse lineup of FIFO memory is offered, enabling individual serial read/write control of each clock using asynchronous and differing clock rates. A built-in self-refresh control circuit eliminates the need for external refresh. The lineup is optimized for processing image data.

Orders require a complete part number, including the access time and package type.

Power supply voltage	Memory density	Number of data bits	Refresh cycle	Function/Part No.	Max. frequency	Access time/Cycle time	Other features	Package	
5V	3Mb	×12	2 Port CLK	FIFO	MSM5412222B	40 MHz	t <sub>AC</sub> CLK 23ns, t <sub>AC</sub> CLK 25ns, 25ns 30ns	CASCADE, 0°C, +70°C	TSOP(II)44
				FIFO	MS8104160A	50 MHz	t <sub>AC</sub> CLK 18ns, t <sub>AC</sub> CLK 20ns, 23ns 25ns	CASCADE, 0°C, +70°C, WCLK COMMON	QFP100
3.3V	3Mb	×12	2 Port CLK	FIFO	MSM54V12222B	50 MHz	t <sub>AC</sub> CLK 18ns, t <sub>AC</sub> CLK 20ns, 23ns 25ns	CASCADE, 0°C, +70°C	TSOP(II)44
				FIFO	MS81V03120	100 MHz	t <sub>AC</sub> CLK 7.5ns, t <sub>AC</sub> CLK 10ns, 8ns 12ns	CASCADE, 0°C, +70°C	TSOP(II)70
	4Mb	×16	2 Port CLK	FIFO	MS81V04160A	50 MHz	t <sub>AC</sub> CLK 18ns, t <sub>AC</sub> CLK 20ns, 23ns 25ns	CASCADE, 0°C, +70°C, WCLK COMMON	QFP100
				FIFO	MS81V04166A	50 MHz	t <sub>AC</sub> CLK 18ns, t <sub>AC</sub> CLK 20ns, 23ns 25ns	CASCADE, 0°C, +70°C, WCLK INDEPENDENT	QFP100
	5Mb	×10	2 Port CLK	FIFO	MS81V05200	77 MHz	t <sub>AC</sub> CLK 8ns, t <sub>AC</sub> CLK 13ns	CASCADE, 0°C, +70°C	TSOP(II)70
				FIFO	MS81V06160	83 MHz	t <sub>AC</sub> CLK 9ns, t <sub>AC</sub> CLK 12ns, 12ns 15ns	CASCADE, 0°C, +70°C	TSOP(II)70
	6Mb	×16	2 Port CLK	FIFO	MS81V10160	83 MHz	t <sub>AC</sub> CLK 9ns, t <sub>AC</sub> CLK 12ns, 12ns 15ns	CASCADE, 0°C, +70°C	TSOP(II)70
				FIFO	MS81V26000	100 MHz	t <sub>AC</sub> CLK 8ns, t <sub>AC</sub> CLK 10ns, 9ns 12ns	START ADD, CASCADE, 0°C, +70°C	TQFP100
	26Mb	×24	2 Port CLK	FIFO	MS81V04160AP	50 MHz	t <sub>AC</sub> CLK 18ns, t <sub>AC</sub> CLK 20ns, 23ns 25ns	CASCADE, -40°C, +85°C, WCLK COMMON	QFP100
				FIFO	MS81V26000-25TPZP3	40 MHz	t <sub>AC</sub> CLK 12ns, t <sub>AC</sub> CLK 15ns	Cu frame, START ADD, CASCADE, -40°C, +85°C	TQFP100

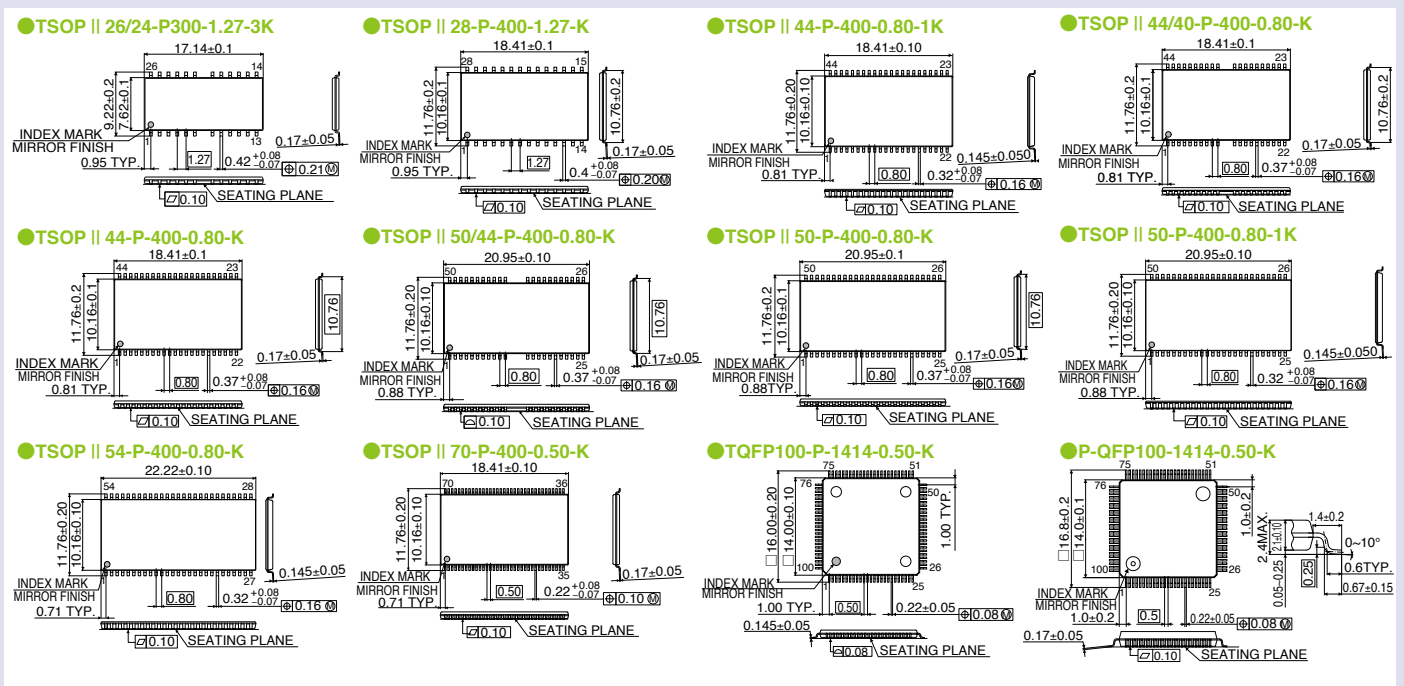
Icon Descriptions:

- FIFO**: DRAM function type
- CASCADE**: FIFO cascade connection function
- 40 MHz to 100 MHz**: Max. operating frequency
- 0°C, +70°C, +85°C**: Operating temperature
- t<sub>AC</sub> CLK 8ns, 10ns to t<sub>AC</sub> CLK 25ns, 30ns**: Access time/Cycle time
- WCLK COMMON, WCLK INDEPENDENT**: 2 ports WCLK pin setting
- Cu**: Cu frame
- START ADD**: Variable top address

### Pin-Compatible Packages

Density	4Mbit	Density	3Mbit / 5Mbit / 6Mbit / 10Mbit	Density	26Mbit
Standard TOP	 <p>14mm×14mm 0.5mm pitch <b>QFP100</b></p>	<p>Flat type (H=1.2mm Max.)</p>  <p>400mill 0.8mm pitch <b>TSOP(II)44</b></p> <p>400mill 0.5mm pitch <b>TSOP(II)70</b></p>	 <p>14mm×14mm 0.5mm pitch <b>TQFP100</b></p>		

### Packages [Unit : mm]

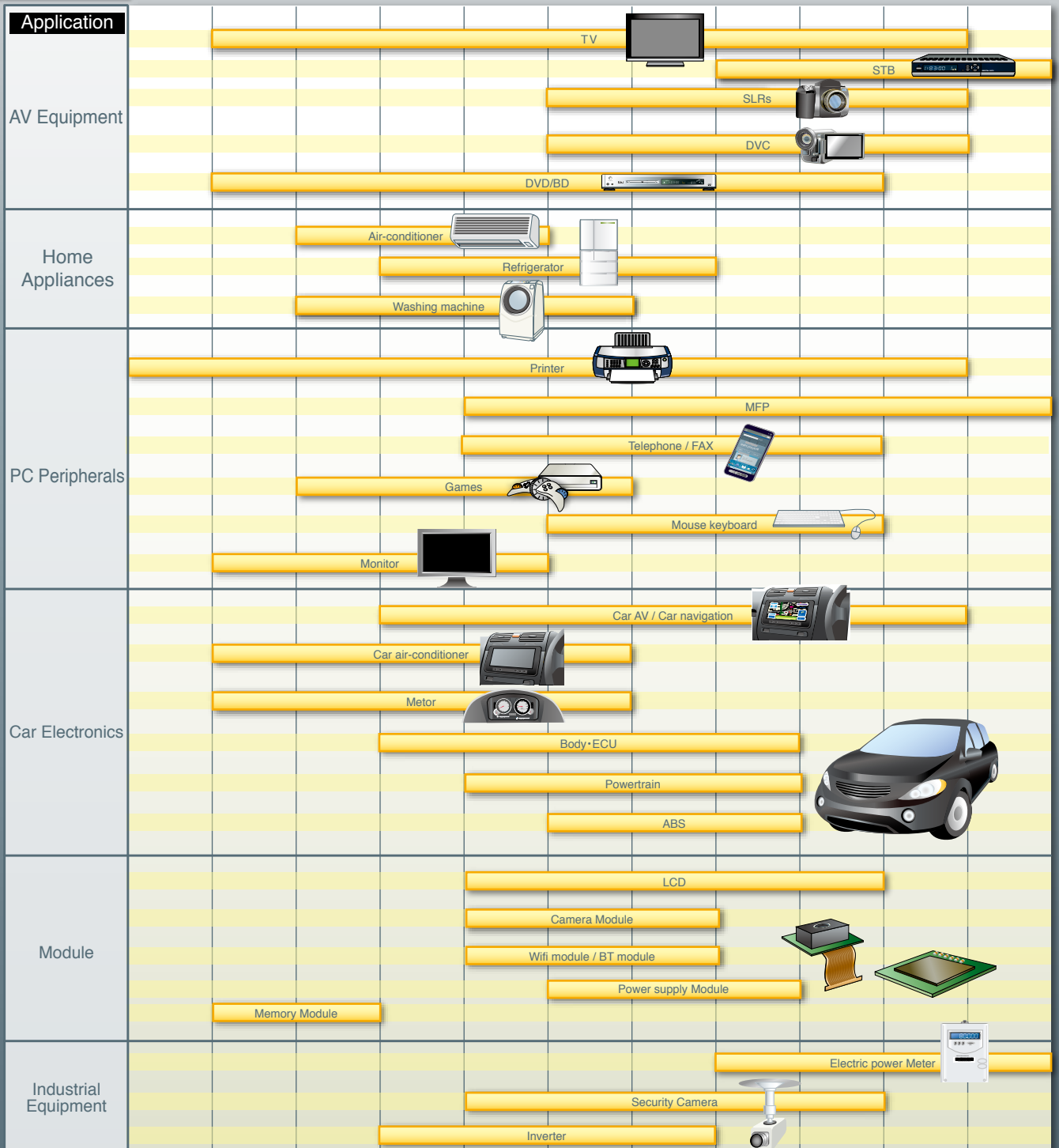


- TSOP II 26/24-P300-1.27-3K**: Dimensions include 17.14±0.1, 14, 9.22±0.2, 7.62±0.1, 1.17±0.2, 1.76±0.2, 1.01±0.1, 0.17±0.05, 0.95 TYP., 1.27, 0.42±0.07, 0.21±0.02, SEATING PLANE.
- TSOP II 28-P-400-1.27-K**: Dimensions include 18.41±0.1, 15, 1.76±0.2, 1.01±0.1, 0.17±0.05, 0.95 TYP., 1.27, 0.4±0.07, 0.20±0.02, SEATING PLANE.
- TSOP II 44-P-400-0.80-1K**: Dimensions include 18.41±0.10, 23, 1.76±0.2, 1.01±0.1, 0.145±0.050, 0.81 TYP., 0.80, 0.32±0.07, 0.16±0.02, SEATING PLANE.
- TSOP II 44/40-P-400-0.80-K**: Dimensions include 18.41±0.1, 23, 1.17±0.2, 1.01±0.1, 0.17±0.05, 0.81 TYP., 0.80, 0.37±0.07, 0.16±0.02, SEATING PLANE.
- TSOP II 44-P-400-0.80-K**: Dimensions include 18.41±0.1, 23, 1.17±0.2, 1.01±0.1, 0.17±0.05, 0.81 TYP., 0.80, 0.37±0.07, 0.16±0.02, SEATING PLANE.
- TSOP II 50/44-P-400-0.80-K**: Dimensions include 20.95±0.10, 26, 1.17±0.2, 1.01±0.1, 0.17±0.05, 0.88 TYP., 0.80, 0.37±0.07, 0.16±0.02, SEATING PLANE.
- TSOP II 50-P-400-0.80-K**: Dimensions include 20.95±0.1, 26, 1.17±0.2, 1.01±0.1, 0.17±0.05, 0.88 TYP., 0.80, 0.37±0.07, 0.16±0.02, SEATING PLANE.
- TSOP II 50-P-400-0.80-1K**: Dimensions include 20.95±0.10, 26, 1.17±0.2, 1.01±0.1, 0.145±0.050, 0.88 TYP., 0.80, 0.32±0.07, 0.16±0.02, SEATING PLANE.
- TSOP II 54-P-400-0.80-K**: Dimensions include 22.22±0.10, 28, 1.17±0.2, 1.01±0.1, 0.145±0.05, 0.71 TYP., 0.80, 0.32±0.07, 0.16±0.02, SEATING PLANE.
- TSOP II 70-P-400-0.50-K**: Dimensions include 18.41±0.10, 36, 1.17±0.2, 1.01±0.1, 0.17±0.05, 0.71 TYP., 0.50, 0.22±0.07, 0.10±0.02, SEATING PLANE.
- TQFP100-P-1414-0.50-K**: Dimensions include 16.00±0.20, 14.00±0.10, 1.00 TYP., 1.00 TYP., 0.145±0.05, 0.50, 0.22±0.05, 0.08±0.02, SEATING PLANE.
- P-QFP100-1414-0.50-K**: Dimensions include 16.8±0.2, 14.0±0.1, 1.0±0.2, 1.4±0.2, 0~10°, 0.6 TYP., 0.67±0.15, 0.05±0.02, 0.22±0.05, 0.08±0.02, SEATING PLANE.

# Serial EEPROM Series lineup

[Density] bit

		1K	2K	4K	8K	16K	32K	64K	128K	256K	512K	1M
I <sup>2</sup> C BUS	Consumer fSCL=400kHz	BR24G01xxx-3 Series	BR24G02xxx-3 Series	BR24G04xxx-3 Series	BR24G08xxx-3 Series	BR24G16xxx-3 Series	BR24G32xxx-3 Series	BR24G64xxx-3 Series	BR24G128xxx-3 Series	BR24G256xxx-3 Series		
	Consumer fSCL=1MHz	BR24G01xxx-3A Series	BR24G02xxx-3A Series	BR24G04xxx-3A Series	BR24G08xxx-3A Series	BR24G16xxx-3A Series	BR24G32xxx-3A Series	BR24G64xxx-3A Series	BR24G128xxx-3A Series	BR24G256xxx-3A Series	BR24G512xxx-3A Series	BR24G1Mxxx-3A Series
MicroWire BUS	Consumer Selectable Bit Format	BR93G46xxx-3 Series	BR93G56xxx-3 Series	BR93G66xxx-3 Series	BR93G76xxx-3 Series	BR93G86xxx-3 Series						
	Consumer Interchangeable BR93xxRxx-W	BR93G46xxx-3A Series	BR93G56xxx-3A Series	BR93G66xxx-3A Series	BR93G76xxx-3A Series	BR93G86xxx-3A Series						
	Consumer Different Pin Layout	BR93G46xxx-3B Series	BR93G56xxx-3B Series	BR93G66xxx-3B Series	BR93G76xxx-3B Series	BR93G86xxx-3B Series						
	Automotive-Grade	BR93H46Rxxx-2C Series	BR93H56Rxxx-2C Series	BR93H66Rxxx-2C Series	BR93H76Rxxx-2C Series	BR93H86Rxxx-2C Series						
SPI BUS	Consumer	BR25L010xxx-W Series	BR25L020xxx-W Series	BR25L040xxx-W Series	BR25L080xxx-W Series	BR25L160xxx-W Series	BR25S320xxx-W Series	BR25S640xxx-W Series	BR25G128xxx-3 Series	BR25G256xxx-3 Series		
	Automotive-Grade	BR25H010xxx-2C Series	BR25H020xxx-2C Series	BR25H040xxx-2C Series	BR25H080xxx-2C Series	BR25H160xxx-2C Series	BR25H320xxx-2C Series	BR25H640xxx-2C Series	BR25H128xxx-2C Series			



EEPROM



## Standard 2-Wire Serial EEPROMs

The I<sup>2</sup>C BUS method, which simplifies wiring considerably, and has been widely adopted in a number of fields, such as AV equipment, industrial systems, and the PC peripheral sector. ROHM's I<sup>2</sup>C BUS EEPROM lineup includes both standard 400kHz models as well as high-speed 1MHz types to suit a wide range of needs.

## I<sup>2</sup>C BUS(2-Wire) Series

**Standard** -40°C to +85°C Operation

### BR24Gxxxxx-3 Series (SCL frequency=400kHz)

Feature	Part No.	Function								Package Type (According to Suffix)					
		DOUBLE CELL	DOUBLE RESET	1.6V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	400kHz (V <sub>CC</sub> =5V)	4kV	DIP-T8	SOP8	SOP-J8	TSSOP-B8	MSOP8	VSON008X2030
1k bit	BR24G01									-3	F-3	FJ-3	FVT-3	FVM-3	NUX-3
2k bit	BR24G02									-3	F-3	FJ-3	FVT-3	FVM-3	NUX-3
4k bit	BR24G04									-3	F-3	FJ-3	FVT-3	FVM-3	NUX-3
8k bit	BR24G08									-3	F-3	FJ-3	FVT-3	FVM-3	NUX-3
16k bit	BR24G16									-3	F-3	FJ-3	FVT-3	FVM-3	NUX-3
32k bit	BR24G32									-3	F-3	FJ-3	FVT-3	FVM-3	NUX-3
64k bit	BR24G64									-3	F-3	FJ-3	FVT-3	FVM-3	NUX-3
128k bit	BR24G128									-3	F-3	FJ-3	FVT-3	FVM-3	NUX-3
256k bit	BR24G256									-3	F-3	FJ-3	FVT-3	-	-

### BR24Gxxxxx-3A Series (SCL frequency=1MHz)

Feature	Part No.	Function								Package Type (According to Suffix)					
		DOUBLE CELL	DOUBLE RESET	1.7V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	1MHz (V <sub>CC</sub> =5V)	4kV	DIP-T8	SOP8	SOP-J8	TSSOP-B8	MSOP8	VSON008X2030
1k bit	BR24G01									-3A	F-3A	FJ-3A	FVT-3A	FVM-3A	NUX-3A
2k bit	BR24G02									-3A	F-3A	FJ-3A	FVT-3A	FVM-3A	NUX-3A
4k bit	BR24G04									-3A	F-3A	FJ-3A	FVT-3A	FVM-3A	NUX-3A
8k bit	BR24G08									-3A	F-3A	FJ-3A	FVT-3A	FVM-3A	NUX-3A
16k bit	BR24G16									-3A	F-3A	FJ-3A	FVT-3A	FVM-3A	NUX-3A
32k bit	BR24G32									-3A	F-3A	FJ-3A	FVT-3A	FVM-3A	NUX-3A
64k bit	BR24G64									-3A	F-3A	FJ-3A	FVT-3A	FVM-3A	NUX-3A
128k bit	BR24G128									-3A	F-3A	FJ-3A	FVT-3A	FVM-3A	NUX-3A
256k bit	BR24G256									-3A	F-3A	FJ-3A	FVT-3A	-	-
512k bit	BR24G512									-3A	F-3A	FJ-3A	FVT-3A	-	-
1M bit	BR24G1M									-3A	F-3A	FJ-3A	-	-	-

Icon Descriptions

- Density (bit)
- Double Cell
- Double Reset
- Input voltage range
- Input voltage range
- Operating temperature
- Write cycle time
- Page write function
- Operating frequency
- Operating frequency
- ESD resistance (HBM)

\*Actual size shown

Package Lineup	DIP-T8	SOP8	SOP-J8	TSSOP-B8	MSOP8	VSON008X2030

EEPROM

## Standard 3-Wire Serial EEPROMs

ROHM's standard serial EEPROM lineup includes 3-wire Microwire bus models that feature a wide operating temperature range up to +85°C and +125°C. In addition, original double cell construction and double reset functionality provide unmatched reliability. The automotive-grade BR93Hxx Series delivers remarkable 6kV ESD resistance, making it ideal for applications requiring superior reliability.

## Microwire BUS(3-Wire) Series

### Standard -40°C to +85°C Operation

#### BR93Gxxxx-3/-3A/-3B Series

Feature	Part No.	Function								Package Type (According to Suffix)					
		DOUBLE CELL	DOUBLE RESET	1.7V~5.5V	-40~+85°C	WRITE 5ms	WRITE ALL	READY BUSY	Noise cancel	DIP-T8	SOP8	SOP-J8	TSSOP-B8	MSOP8	VSON008X2030
1k bit	BR93G46	DOUBLE CELL	DOUBLE RESET	1.7V~5.5V	-40~+85°C	WRITE 5ms	WRITE ALL	READY BUSY	Noise cancel	-3/-3A/-3B	F-3/-3A/-3B	FJ-3/-3A/-3B	FVT-3/-3A/-3B	FVM-3/-3A/-3B	NUX-3/-3A/-3B
2k bit	BR93G56	DOUBLE CELL	DOUBLE RESET	1.7V~5.5V	-40~+85°C	WRITE 5ms	WRITE ALL	READY BUSY	Noise cancel	-3/-3A/-3B	F-3/-3A/-3B	FJ-3/-3A/-3B	FVT-3/-3A/-3B	FVM-3/-3A/-3B	NUX-3/-3A/-3B
4k bit	BR93G66	DOUBLE CELL	DOUBLE RESET	1.7V~5.5V	-40~+85°C	WRITE 5ms	WRITE ALL	READY BUSY	Noise cancel	-3/-3A/-3B	F-3/-3A/-3B	FJ-3/-3A/-3B	FVT-3/-3A/-3B	FVM-3/-3A/-3B	NUX-3/-3A/-3B
8k bit	BR93G76	DOUBLE CELL	DOUBLE RESET	1.7V~5.5V	-40~+85°C	WRITE 5ms	WRITE ALL	READY BUSY	Noise cancel	-3/-3A/-3B	F-3/-3A/-3B	FJ-3/-3A/-3B	FVT-3/-3A/-3B	FVM-3/-3A/-3B	NUX-3/-3A/-3B
16k bit	BR93G86	DOUBLE CELL	DOUBLE RESET	1.7V~5.5V	-40~+85°C	WRITE 5ms	WRITE ALL	READY BUSY	Noise cancel	-3/-3A/-3B	F-3/-3A/-3B	FJ-3/-3A/-3B	FVT-3/-3A/-3B	FVM-3/-3A/-3B	NUX-3/-3A/-3B

### Pin Assignment



### Automotive Grade -40°C to +125°C Operation

#### BR93Hxxxx-2C Series

Feature	Part No.	Function								Package Type (According to Suffix)			
		DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	WRITE ALL	READY BUSY	6kV	SOP8	SOP-J8	TSSOP-B8	MSOP8
1k bit	BR93H46	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	WRITE ALL	READY BUSY	6kV	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C
2k bit	BR93H56	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	WRITE ALL	READY BUSY	6kV	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C
4k bit	BR93H66	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	WRITE ALL	READY BUSY	6kV	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C
8k bit	BR93H76	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	WRITE ALL	READY BUSY	6kV	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C
16k bit	BR93H86	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	WRITE ALL	READY BUSY	6kV	RF-2C	RFJ-2C	RFVT-2C	RFVM-2C

EEPROM

Icon Descriptions	1k bit to 16k bit	DOUBLE CELL	DOUBLE RESET	1.7V~5.5V	2.5V~5.5V	-40~+85°C	-40~+125°C	Operating temperature	WRITE 4ms	WRITE 5ms	Write cycle time	
		Density(bit)	Double Cell	Double Reset	Input voltage range					Write all function	Ready/Busy status display capability	Noise cancelling function built in

Package Lineup	DIP-T8	SOP8	SOP-J8	TSSOP-B8	MSOP8	VSON008X2030

\*Actual size shown

## SPI BUS Series

Ideal for high-speed, feature-rich applications

Our universally compliant SPI BUS Series are optimized for applications requiring high-speed operation up to 20MHz. Proprietary double cell construction and double reset functionality deliver superior reliability.

### Standard -40°C to +85°C Operation

#### BR25L/S/Gxxxxxx-W/3 Series

Feature	Part No.	Function										Package Type (According to Suffix)				
		DOUBLE CELL	DOUBLE RESET	1.8V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	20MHz (Vcc=1.5V)	4kV	SOP8	SOP-J8	TSSOP-B8	MSOP8	VSON008X2030
1k bit	BR25L010	DOUBLE CELL	DOUBLE RESET	1.8V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	20MHz (Vcc=1.5V)	4kV	F-W	FJ-W	FVT-W	FVM-W	-
2k bit	BR25L020	DOUBLE CELL	DOUBLE RESET	1.8V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	20MHz (Vcc=1.5V)	4kV	F-W	FJ-W	FVT-W	FVM-W	-
4k bit	BR25L040	DOUBLE CELL	DOUBLE RESET	1.8V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	20MHz (Vcc=1.5V)	4kV	F-W	FJ-W	FVT-W	FVM-W	-
8k bit	BR25L080	DOUBLE CELL	DOUBLE RESET	1.8V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	20MHz (Vcc=1.5V)	4kV	F-W	FJ-W	FVT-W	-	-
16k bit	BR25L160	DOUBLE CELL	DOUBLE RESET	1.8V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	20MHz (Vcc=1.5V)	4kV	F-W	FJ-W	FVT-W	-	-
32k bit	BR25S320	DOUBLE CELL	DOUBLE RESET	1.7V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	20MHz (Vcc=1.5V)	4kV	F-W	FJ-W	FVT-W	FVM-W	NUX-W
64k bit	BR25S640	DOUBLE CELL	DOUBLE RESET	1.7V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	20MHz (Vcc=1.5V)	4kV	F-W	FJ-W	FVT-W	FVM-W	-
128k bit	BR25G128	DOUBLE CELL	DOUBLE RESET	1.6V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	20MHz (Vcc=1.5V)	4kV	F-3	FJ-3	FVT-3	FVM-3	NUX-3
256k bit	BR25G256	DOUBLE CELL	DOUBLE RESET	1.6V~5.5V	-40~+85°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	20MHz (Vcc=1.5V)	4kV	F-3	FJ-3	FVT-3	-	-

### Automotive Grade -40°C to +125°C Operation

#### BR25Hxxxxxx-2C Series

Feature	Part No.	Function										Package Type (According to Suffix)				
		DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	PAGE WRITE	STATUS REGISTER	READY BUSY	6kV	20MHz (Vcc=1.5V)	6kV	SOP8	SOP-J8	TSSOP-B8	MSOP8
1k bit	BR25H010	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	PAGE WRITE	STATUS REGISTER	READY BUSY	6kV	20MHz (Vcc=1.5V)	6kV	F-2C	FJ-2C	FVT-2C	FVM-2C
2k bit	BR25H020	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	PAGE WRITE	STATUS REGISTER	READY BUSY	6kV	20MHz (Vcc=1.5V)	6kV	F-2C	FJ-2C	FVT-2C	FVM-2C
4k bit	BR25H040	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	PAGE WRITE	STATUS REGISTER	READY BUSY	6kV	20MHz (Vcc=1.5V)	6kV	F-2C	FJ-2C	FVT-2C	FVM-2C
8k bit	BR25H080	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	PAGE WRITE	STATUS REGISTER	READY BUSY	6kV	20MHz (Vcc=1.5V)	6kV	F-2C	FJ-2C	FVT-2C	FVM-2C
16k bit	BR25H160	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	PAGE WRITE	STATUS REGISTER	READY BUSY	6kV	20MHz (Vcc=1.5V)	6kV	F-2C	FJ-2C	FVT-2C	FVM-2C
32k bit	BR25H320	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	PAGE WRITE	STATUS REGISTER	READY BUSY	6kV	20MHz (Vcc=1.5V)	6kV	F-2C	FJ-2C	FVT-2C	FVM-2C
64k bit	BR25H640	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	PAGE WRITE	STATUS REGISTER	READY BUSY	6kV	20MHz (Vcc=1.5V)	6kV	F-2C	FJ-2C	FVT-2C	-
128k bit	BR25H128	DOUBLE CELL	DOUBLE RESET	2.5V~5.5V	-40~+125°C	WRITE 4ms	PAGE WRITE	STATUS REGISTER	READY BUSY	6kV	20MHz (Vcc=1.5V)	6kV	F-2C	FJ-2C	-	-

Icon Descriptions	1k bit to 256k bit Density (bit)	DOUBLE CELL Double Cell	DOUBLE RESET Double Reset	1.6V~5.5V 1.7V~5.5V 1.8V~5.5V 2.5V~5.5V Input voltage range	-40~+85°C -40~+125°C Operating temperature	WRITE 4ms WRITE 5ms Write cycle time	PAGE WRITE Page write function	STATUS REGISTER Status register function	READY BUSY Ready/Busy status display capability	20MHz (Vcc=1.5V) Operating frequency	4kV 6kV ESD resistance(HBM)
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\*Actual size shown

Package Lineup	SOP8	SOP-J8	TSSOP-B8	MSOP8	VSON008X2030

EEPROM

## Ultra-Compact WL-CSP

### Optimized for compact modules

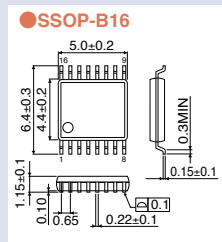
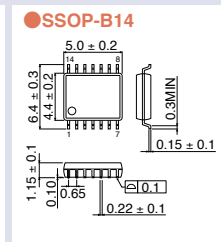
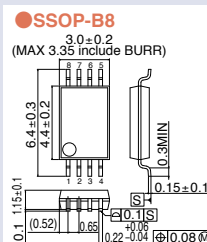
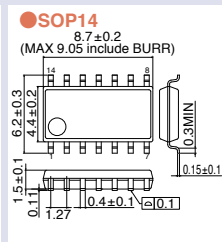
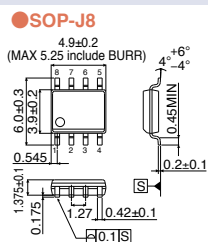
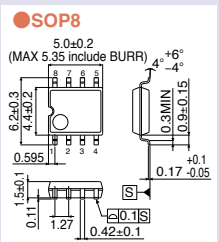
Our broad ultra-compact WL-CSP lineup is designed for sets with severe space restrictions, such as camera and communication modules.

Feature	Part No.	Function						Size(mm)			Solder ball(mm)		Resin	Pull-up resistor	Package	Drawing	
								X (Typ.)	Y (Typ.)	Height (Max.)	φ	Pitch					
2k bit	BU9833GUL-W	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.27	1.50	0.55	0.25	0.5	○	—	VCSP50L1			
4k bit	BU9847GUL-W	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.95	1.06	0.55	0.25	0.5	○	—	VCSP50L1			
8k bit	BU9889GUL-W	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.60	1.00	0.55	0.25	0.5	○	—	VCSP50L1			
8k bit	BRCB008GWZ-3	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	0.94	0.94	0.33	0.20	0.4	—	—	UCSP30L1			
16k bit	BRCA016GWZ-W	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.30	0.77	0.35	0.20	0.4	—	—	UCSP30L1			
16k bit	BRCB016GWL-3	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.10	1.15	0.55	0.25	0.4	—	—	UCSP50L1			
16k bit	BRCC016GWX-3	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.30	0.77	0.20	None	0.4	—	WP	UCSP16X1			
16k bit	BRCD016GWZ-3	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.30	0.77	0.40	0.20	0.4	○	—	UCSP35L1			
32k bit	BRCB032GWZ-3	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.45	0.77	0.33	0.20	0.4	—	—	UCSP30L1			
64k bit	BRCB064GWZ-3	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.50	1.00	0.35	0.20	0.4	—	WP	UCSP30L1			
64k bit	BRCE064GWZ-3	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.50	1.00	0.30	0.20	0.4	—	—	UCSP25L1			
64k bit	BRCG064GWZ-3	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	1.50	1.00	0.36	0.20	0.4	○	—	UCSP25L1			
128k bit	BU9897GUL-W	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	2.44	1.99	0.55	0.25	0.5	○	—	VCSP50L2			
8k bit	BU9832GUL-W	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	2.09	1.85	0.55	0.25	0.5	○	—	VCSP50L2	
16k bit	BU9829GUL-W	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	1.74	1.65	0.55	0.25	0.5	○	—	VCSP50L1	
128k bit	BR25S128GUZ-W	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms	PAGE WRITE	STATUS REGISTER	READY BUSY	2.00	2.63	0.40	0.25	0.5	○	—	VCSP35L2	
4k bit	BU9891GUL-W	DOUBLE CELL	DOUBLE RESET	-40°C	WRITE 5ms				1.60	1.00	0.55	0.25	0.5	○	—	VCSP50L1	

EEPROM

1°C BUS Interface	SPI BUS Interface	Microwire interface	2k bit to 128k bit Density(bit)	Double Cell	Double Reset
Operating temperature: -40°C to +85°C	Write cycle time: 5ms	Page write function	Status register function	Ready/Busy status display capability	

### Packages [Unit : mm]



## Plug & Play EEPROM For Memory Modules

### Ideal for specific applications

ROHM Plug & Play EEPROMs are tailored for specialized applications. A number of models are offered for memory modules and displays.

Feature	Part No.	Function	Write Protect	TSSOP-B8	VSON008X2030
	<b>BR34L02</b>		Write Protect functionality based on One-Time ROM	FVT-W	—
	<b>BR34E02</b>		Resettable/One-Time ROM Write Protect functions	FVT-3	NUX-3

Icon Descriptions	PC BUS Interface	Density(bit)	Double Cell	Double Reset	1M. Erase/Write Cycle	Supports Serial Presence Detect
	For DDR1/2/3					

\*Actual size shown

Package Lineup	TSSOP-B8	VSON008X2030

# EEPROM

## Plug & Play EEPROM For Display

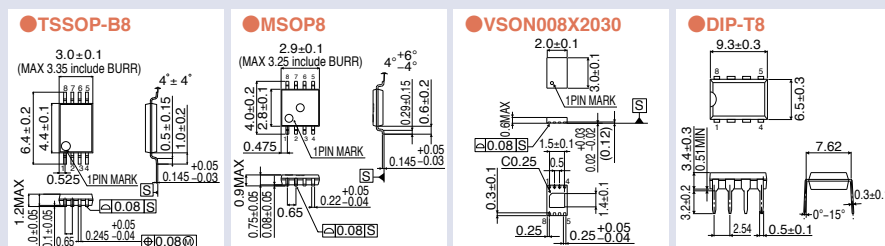
Feature	Part No.	Function	Function Descriptions	Package Type (According to Suffix)						
				SOP8	SOP-J8	SSOP-B8	SOP14	SSOP-B14	SSOP-B16	VSON008X2030
	<b>BR24C21</b>		Supports DDC1™/DDC2™ for displays	F	FJ	FV	—	—	—	—
	<b>BU9882</b>		Dual-port type compatible with DDC2™ for displays	—	—	—	F-W	FV-W	—	—
	<b>BU9883</b>		2Kbit x 3ch EEPROM for HDMI ports	—	—	—	—	—	FV-W	—
	<b>BU99022</b>		2Kbit x 2ch type	—	—	—	—	—	—	NUX-3

Icon Descriptions	Bit configuration and number of channels	Double Cell	Double Reset	Supports DDC1/2B	Compatible with HDMI

\*Actual size shown




Package Lineup	SOP8	SOP-J8	SSOP-B8	SOP14	SSOP-B14	SSOP-B16	VSON008X2030

EEPROM

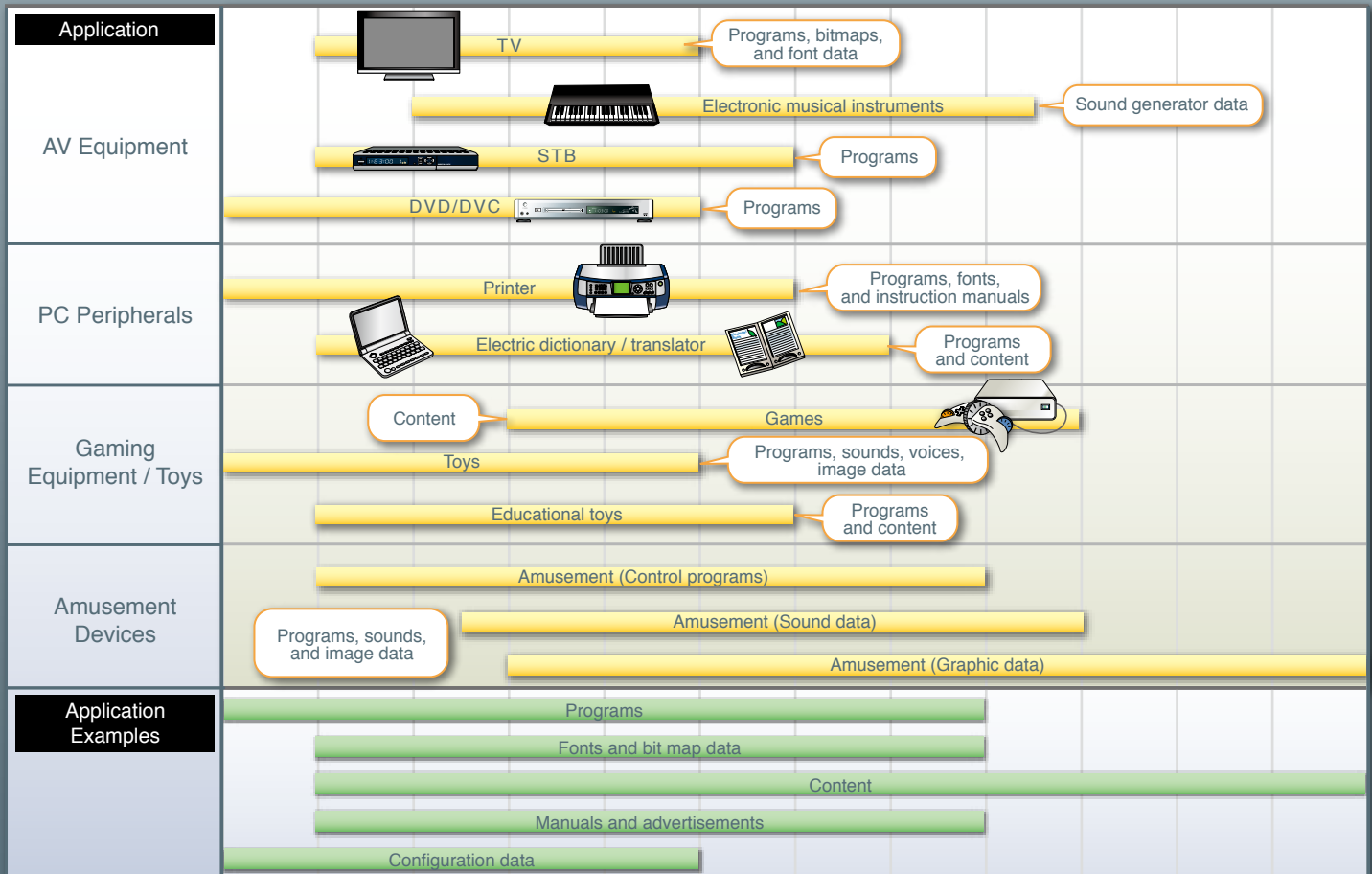


# FeRAM Series lineup

Ideal for continuous log data acquisition and emergency backup applications

	32K	64K	256K	2M
I <sup>2</sup> C		MR44V064A		
SPI	MR45V032A		MR45V256A	MR45V200A
Parallel			MR48V256C	
Car Equipment	Car navigation 			
	Car audio 			
	Body Electrical Systems (Power Windows/Seats)			
Industrial Equipment	PLC (Programmable Controllers)			
	Copiers and MFPs 			
	Meters (Electric/Gas/Water)			
Amusement Devices	Gaming Systems			

# NOR Flash Series lineup

Memory density	8M	16M	32M	64M	128M	256M	512M	1G	2G	4G	8G	16G
<b>NOR Flash</b>	MR29Vxxx52A Series											
<b>Application</b>												
<b>AV Equipment</b>	TV: Programs, bitmaps, and font data Electronic musical instruments: Sound generator data STB: Programs DVD/DVC: Programs											
<b>PC Peripherals</b>	Printer: Programs, fonts, and instruction manuals Electric dictionary / translator: Programs and content											
<b>Gaming Equipment / Toys</b>	Content: Games Toys: Programs, sounds, voices, image data Educational toys: Programs and content Amusement (Control programs)											
<b>Amusement Devices</b>	Programs, sounds, and image data Amusement (Sound data) Amusement (Graphic data)											
<b>Application Examples</b>	Programs Fonts and bit map data Content Manuals and advertisements Configuration data											

FeRAM / NOR Flash

## FeRAM Series

Non-volatile memory featuring high Write speed (150ns) and superior reliability (1 trillion Reads/Writes)

FeRAM memory Series provides 1 million times more rewrites at 100,000 times the speed of Flash memory. Ideal for saving data during power outages, storing high frequency log data, and the like.

Supply voltage	Memory density	Number of data bits	Function	Part No.	Max. Operating Frequency	No. of Reads/Writes	Data Retention Period	Operating Temp. Range	Package
<b>New</b> 2.7V to 3.6V	256Kb	×8	Parallel	<b>MR48V256C</b>	t <sub>RC</sub> 150ns	10 <sup>12</sup>	10 YEARS	-40°C to +85°C	TSOP(I)28
2.5V to 3.6V	64Kb	×8	IC	<b>MR44V064A</b>	CLK 3.4MHz	10 <sup>12</sup>	10 YEARS	-40°C to +85°C	SOP8
2.7V to 3.6V	32Kb	×8	SPI	<b>MR45V032A</b>	CLK 15MHz	10 <sup>12</sup>	10 YEARS	-40°C to +85°C	SOP8
3.0V to 3.6V	256Kb	×8	SPI	<b>MR45V256A</b>	CLK 15MHz	10 <sup>12</sup>	10 YEARS	-40°C to +85°C	SOP8
<b>New</b> 2.7V to 3.6V	2Mb	×8	SPI	<b>MR45V200A</b>	CLK 34MHz	10 <sup>12</sup>	10 YEARS	-40°C to +85°C	DIP8

Icon Descriptions	Parallel interface	IC Bus interface	SPI interface	t <sub>RC</sub> 150ns	CLK 3.4MHz	CLK 15MHz	CLK 34MHz	Max. operating frequency	10 <sup>12</sup> No. of Reads/Writes (lifetime)	10 YEARS Data retention period	-40°C to +85°C Operating temp. range
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\*Actual size shown



## NOR Flash

High-speed Write/Erase with excellent data retention quality

Current required for Write operation is minimized, enabling simultaneous writing to multiple cells for faster Write operation. In addition, a floating gate structure and rewrite damage suppression ensures more than 10,000 rewrites and data retention for up to 20 years.

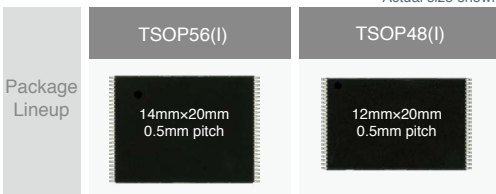
## NOR Flash Series

Supply voltage	Memory density	Number of data bits	Page size (word/bit)	Function	Part No.	2.7V access time	Page access time	Other features	Package
<b>Planned</b>	256Mb	×8	16×16	NOR PAGE	<b>MR29V25652A-xxxTA</b>	TBD	TBD	-40°C to +85°C	TSOP(I)56
<b>Under development</b>	128Mb	×8	16×16	NOR PAGE	<b>MR29V12852A-xxxTA</b>	t <sub>AC</sub> 70ns	t <sub>PA</sub> 25ns	-40°C to +85°C	TSOP(I)56
<b>Planned</b>	64Mb	×8	16×16	NOR PAGE	<b>MR29V06452A-xxxTN</b>	TBD	TBD	-40°C to +85°C	TSOP(I)48
<b>Under development</b>	32Mb	×8	16×16	NOR PAGE	<b>MR29V03252A-xxxTN</b>	t <sub>AC</sub> 80ns	t <sub>PA</sub> 25ns	-40°C to +85°C	TSOP(I)48

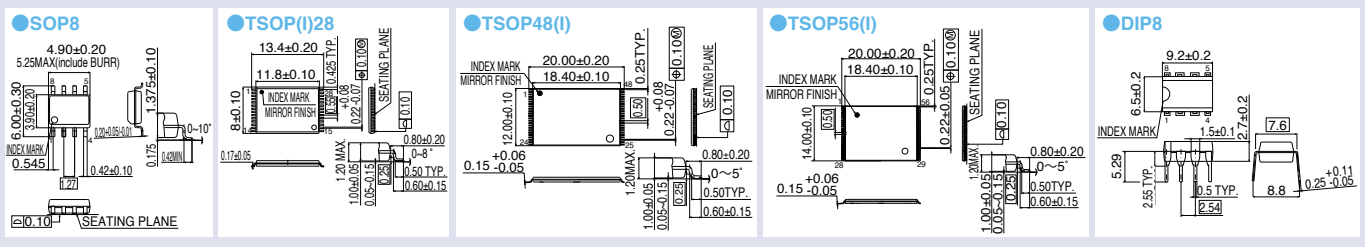
xxx denotes the ROM code number.

Icon Descriptions	NOR PAGE	P2ROM™ Function type	TBD To be determined	t <sub>AC</sub> 70ns	t <sub>AC</sub> 80ns	Access time	t <sub>PA</sub> 25ns	Page access time	-40°C to +85°C Operating temperature range
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\*Actual size shown



### Packages [Unit : mm]



FeRAM / NOR Flash

# Non-Volatile Memory P2ROM™ (Production Programmed ROM) lineup

[Density] bit

Memory density	8M	16M	32M	64M	128M	256M	512M	1G	2G	4G	8G	16G
Parallel BUS Standard P2ROM™	● MR27T802F Series ● MR27V802F Series		● MR27T12800L-xxxTN ● MR27Txxx02L Series				● MR26T51203L-xxxTM ● MR27T25603L-xxxTM ● MR37T25602T-xxxTA					
Parallel BUS Page Mode P2ROM™	● MR26V6455J-xxxMB ● MR37Vxxx52x Series		● MR37V25653T-xxxMB ● MR27V25653L-xxxMB ● MR27Vxxx52x Series				● MR26Vxxx53L Series ● MR36V01G52B-xxxTA ● MR26V51252R-xxxTA		● MR36Vxxx54x Series ● MR36V16G56C-xxxLB ● MR36V08G87C-xxxMB ● MR36V08G57C-xxxMB ● MR26V02G54R-xxxMB Series			
SPI BUS P2ROM™			● MR37V12841A-xxxMP ● MR37Vxxx41B Series ● MR37Vxxx43B Series ● MR27Vxxx41L Series									
AS@P2ROM™ with Built-In Gate Array (Application Specific P2ROM™)			● MR25Txxx7xL Series				● MR35Vxxx7xB Series					
Application												
AV Equipment	<p>TV: Programs, bitmaps, and font data</p> <p>Electronic musical instruments: Sound generator data</p> <p>STB: Programs</p> <p>DVD/DVC: Programs</p>											
PC Peripherals	<p>Printer: Programs, fonts, and instruction manuals</p> <p>Electric dictionary / translator: Programs and content</p>											
Gaming Equipment / Toys	<p>Content: Games</p> <p>Toys: Programs, sounds, voices, image data</p> <p>Educational toys: Programs and content</p>											
Amusement Devices	<p>Amusement (Control programs)</p> <p>Amusement (Sound data)</p> <p>Amusement (Graphic data)</p> <p>Programs, sounds, and image data</p>											
Application Examples	<p>Programs</p> <p>Fonts and bitmap data</p> <p>Content</p> <p>Manuals and advertisements</p> <p>Configuration data</p>											

P2ROM™



## Parallel BUS Standard P2ROM™ Series

Replaces NOR Flash and Mask ROM in applications requiring no rewrite operation

This Series offers selectable memory density from 8Mbit to 512Mbit and provides standard performance. Parallel BUS products are available in NOR Flash-compatible switchable x8bit/x16bit models as well as proprietary and Mask ROM-compatible pin layouts. In addition, superior data reliability eliminates the need for error correction (ECC) required for NAND Flash.

### Exclusive Pin Assignment

xxx denotes the ROM code number.

Supply voltage	Memory density	Number of data bits	Function	Part No.	Socket Mounting Support	3.0V access time	2.7V access time	Other features	Package frame	Package
2.7V to 3.6V	512Mb	x8	NOR	MR26T51203L-xxxTM		tAC 100ns	tAC 120ns	0°C to +70°C		TSOP(II)50
			NOR	MR27T25603L-xxxTM		tAC 100ns	tAC 120ns	0°C to +70°C		TSOP(II)50

### Mask ROM-Compatible Pin Assignment

xxx denotes the ROM code number.

2.7V to 3.6V	128Mb	x8	NOR	MR27T12800L-xxxTN		tAC 90ns	tAC 90ns	0°C to +70°C		TSOP(I)48
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### NOR Flash-Compatible Pin Assignment

xxx denotes the ROM code number.

Supply voltage	Memory density	Number of data bits	Function	Part No.	Socket Mounting Support	3.0V access time	2.7V access time	Other features	Package frame	Package	
2.7V to 3.6V	256Mb	x8	NOR	MR37T25602T-xxxTA		tAC 100ns	tAC 150ns	0°C to +70°C		TSOP(I)56	
			NOR	MR27T12802L-xxxTA		tAC 80ns	tAC 90ns	0°C to +70°C		TSOP(I)56	
	128Mb	x8	NOR	MR27T6402L-xxxMA	CG	tAC 70ns	tAC 90ns	0°C to +70°C		SOP44	
			NOR	MR27T6402L-xxxTN		tAC 70ns	tAC 90ns	0°C to +70°C	Cu	TSOP(I)48	
	64Mb	x8	NOR	MR27T6402L-xxxLY		tAC 70ns	tAC 90ns	0°C to +70°C		TFBGA48	
			NOR	MR27T6402L-xxxTNA		tAC 80ns	tAC 90ns	-40°C to +85°C		TSOP(I)48	
	32Mb	x8	NOR	MR27T3202L-xxxMA	CG	tAC 70ns	tAC 90ns	0°C to +70°C		SOP44	
			NOR	MR27T3202L-xxxTN		tAC 70ns	tAC 90ns	0°C to +70°C		TSOP(I)48	
	16Mb	x8	NOR	MR27T3202L-xxxLA		tAC 70ns	tAC 90ns	0°C to +70°C		TFBGA48	
			NOR	MR27T3202L-xxxTNA		tAC 80ns	tAC 90ns	-40°C to +85°C		TSOP(I)48	
	8Mb	x8	NOR	MR27T1602L-xxxMA	CG	tAC 70ns	tAC 70ns	0°C to +70°C		SOP44	
			NOR	MR27T1602L-xxxTN		tAC 70ns	tAC 70ns	0°C to +70°C	Cu	TSOP(I)48	
	8Mb	x8	NOR	MR27T1602L-xxxLA		tAC 70ns	tAC 70ns	0°C to +70°C		TFBGA48	
			NOR	MR27T1602L-xxxTNA		tAC 70ns	tAC 70ns	-40°C to +85°C	Cu	TSOP(I)48	
	3.0V to 3.6V	8Mb	x8	NOR	MR27T802F-xxxMA		tAC 80ns	tAC 80ns	0°C to +70°C		SOP44
				NOR	MR27T802F-xxxTN		tAC 80ns	tAC 80ns	0°C to +70°C		TSOP(I)48
3.0V to 3.6V	8Mb	x8	NOR	MR27V802F-xxxMA		tAC 70ns	tAC 70ns	0°C to +70°C		SOP44	
			NOR	MR27V802F-xxxTN		tAC 70ns	tAC 70ns	0°C to +70°C		TSOP(I)48	

### Die Form Products

xxx denotes the ROM code number.

Supply voltage	Memory density	Number of data bits	Function	Part No.	Socket Mounting Support	Access time	Operating temperature	Package frame	Pad size	Package
3.0V to 3.6V	128Mb	x8	NOR	MR27V12800L-xxxWE		tAC 85ns	0°C to +70°C		7 SIZE	Chip
			NOR	MR27V6402L-xxxWE		tAC 70ns	0°C to +70°C		7 SIZE	Chip
			NOR	MR27V3202L-xxxWE		tAC 80ns	0°C to +70°C		7 SIZE	Chip
			NOR	MR27V1602L-xxxWE		tAC 70ns	0°C to +70°C		7 SIZE	Chip
			NOR	MR27V802F-xxxWA		tAC 90ns	0°C to +70°C		7 SIZE	Chip

Icon descriptions

NOR Function type

CG Supports socket mounting

tAC 70ns to tAC 150ns Access time

-40°C to +85°C Operating temperature

Cu Cu frame

7 SIZE 7 SIZE Pad size

### Pin-Compatible Packages

\*Actual size shown

Density	8Mbit / 16Mbit / 32Mbit / 64Mbit / 128Mbit	128Mbit / 256Mbit	256Mbit / 512Mbit	
Flat type	Top 12mm×20mm 0.5mm pitch TSOP(I)48	Top 14mm×20mm 0.5mm pitch TSOP(I)56	Top 400mill 0.8mm pitch TSOP(II)50	
	Standard	Top 600mill 1.27mm pitch SOP44	Compact Top Bottom 6.0mm×8.0mm 0.8mm pitch TFBGA48	Top Bottom 6.4mm×10mm 0.8mm pitch TFBGA48

## Parallel BUS Page Mode P2ROM™ Series

Replaces NOR Flash and Mask ROM products

LAPIS Semiconductor provides a wide variety of products ranging from parallel page mode products with 16bit / 8bit BUS width which are widely used for NOR Flash and Mask ROM, to large density and high speed products with expanded BUS width which are ideal for sound / image data storage.

### Exclusive Pin Assignment

xxx denotes the ROM code number.

Supply voltage	Memory density	Number of data bits	Page size (word/bit)	Function	Part No.	Socket Mounting Support	3.0V access time	Page access time	Other features	Package
3.0V to 3.6V	16Gb	x64	end less	NOR	LVN PAGE	CG	tAC 100ns	tPA 40ns	0°C	LGA140
	8Gb	x32	endless 16:32		LVN PAGE		tAC 100ns	tPA 40ns	+70°C	SSOP70
	4Gb	x16	8x32	NOR	LVN PAGE	CG	tAC 100ns	tPA 40ns	0°C	SSOP70
					LVN PAGE		tAC 105ns	tPA 25ns	+70°C	SSOP70
	2Gb	x16	8x32	NOR	LVN PAGE	CG	tAC 130ns	tPA 25ns	0°C	SSOP70
					LVN PAGE		tAC 105ns	tPA 25ns	+70°C	SSOP70
	1Gb	x8	8x16	NOR	LVN PAGE	CG	tAC 105ns	tPA 25ns	0°C	SSOP70
					LVN PAGE		tAC 105ns	tPA 35ns	+70°C	SSOP70
	512Mb	x8	8x16	NOR	LVN PAGE	CG	tAC 100ns	tPA 35ns	0°C	SSOP70
					LVN PAGE		tAC 100ns	tPA 25ns	+70°C	SSOP70
	256Mb	x16	8x32	NOR	LVN PAGE	CG	tAC 100ns	tPA 35ns	0°C	SSOP70
					LVN PAGE		tAC 100ns	tPA 35ns	+70°C	SSOP70
	64Mb	x16	8x32	NOR	LVN PAGE	CG	tAC 100ns	tPA 30ns	0°C	SSOP70
					LVN PAGE		tAC 100ns	tPA 30ns	+70°C	SSOP70

### Mask ROM-Compatible Pin Assignment

xxx denotes the ROM code number.

3.0V to 3.6V	128Mb	x8	8x16	NOR	PAGE	CG	tAC 85ns	tPA 30ns	0°C	TSOP(I)48
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### NOR Flash-Compatible Pin Assignment

xxx denotes the ROM code number.

3.0V to 3.6V	1Gb	x8	8x16	NOR	PAGE	CG	tAC 105ns	tPA 25ns	0°C	TSOP(I)56
	512Mb						tAC 105ns	tPA 25ns	+70°C	TSOP(I)56
	256Mb						tAC 100ns	tPA 25ns	0°C	TSOP(I)56
	128Mb						tAC 85ns	tPA 30ns	+70°C	TSOP(I)56
							tAC 90ns	tPA 30ns	0°C	TSOP(I)56
	64Mb						tAC 90ns	tPA 30ns	+70°C	TSOP(I)48
							tAC 90ns	tPA 30ns	0°C	TSOP(I)48
	32Mb						tAC 90ns	tPA 30ns	+70°C	TSOP(I)56
							tAC 80ns	tPA 25ns	-40°C	TSOP(I)48
	16Mb						tAC 70ns	tPA 25ns	+70°C	SOP44
							tAC 70ns	tPA 25ns	0°C	TSOP(I)48
	16Mb						tAC 80ns	tPA 25ns	+70°C	SOP44
							tAC 80ns	tPA 25ns	0°C	TSOP(I)48

### Die Form Products

xxx denotes the ROM code number.

3.0V to 3.6V	256Mb	x8	8x16	NOR	PAGE	CG	tAC 100ns	tPA 35ns	0°C	Chip
	128Mb						tAC 85ns	tPA 30ns	+70°C	Chip
	64Mb						tAC 90ns	tPA 30ns	+70°C	Chip
	16Mb						tAC 80ns	tPA 25ns	0°C	Chip

Icon descriptions

NOR

LVN

PAGE

Function type

CG

Supports socket mounting

tAC 70ns to tAC 100ns

Access time

tPA 25ns to tPA 40ns

Page access time

0°C

-40°C

Operating temperature

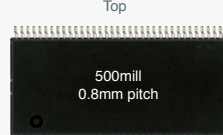
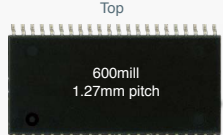
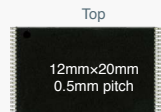

Chip size

Chip size

Pad size

### Standard Packages

\*Actual size shown

I/O	x8bit / x16bit / x32bit	I/O	x8bit / x16bit
Density	16Mbit / 32Mbit / 64Mbit / 256Mbit / 512Mbit / 1Gbit / 2Gbit / 4Gbit / 8Gbit	Density	16Mbit / 32Mbit / 64Mbit / 128Mbit / 256Mbit / 512Mbit / 1Gbit
Standard	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Top</p>  <p>500mill 0.8mm pitch</p> <p>SSOP70</p> </div> <div style="text-align: center;"> <p>Top</p>  <p>600mill 1.27mm pitch</p> <p>SOP44</p> </div> </div>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Top</p>  <p>12mmx20mm 0.5mm pitch</p> <p>TSOP(I)48</p> </div> <div style="text-align: center;"> <p>Top</p>  <p>14mmx20mm 0.5mm pitch</p> <p>TSOP(I)56</p> </div> </div>	
	Flat type		

## SPI BUS P2ROM™ Series

**Reduces material costs and noise while contributing to greater space savings**

Our SPI BUS P2ROM™ lineup supports the SPI (Serial Peripheral Interface) standard. In addition, adopting the same package for all densities (16Mbit to 128Mbit) makes it possible to change the density without changing/modifying the PCB.

SPI BUS				xxx denotes the ROM code number.					
Supply voltage	Memory density	Number of data bits	Function	Part No.	FAST READ	READ	Other features	Package	
3.0V to 3.6V <i>Under development</i>	128Mb	×1	SPI	MR37V12841A-xxxMP	33 MHz	20 MHz	0°C +70°C	SOP16	
			SPI	MR37V12841B-xxxMP	86 MHz	50 MHz	0°C +70°C	SOP16	
		×1×2×4		SPI	MR37V12843B-xxxMP	86 MHz	50 MHz	0°C +70°C	SOP16
		×1		SPI	MR27V6441L-xxxMP	33 MHz	20 MHz	0°C +70°C	SOP16
	64Mb	×1	SPI	MR37V6441B-xxxMP	86 MHz	50 MHz	0°C +70°C	SOP16	
			×1×2×4		SPI	MR37V6443B-xxxMP	86 MHz	50 MHz	0°C +70°C
		×1		SPI	MR27V3241L-xxxMP	33 MHz	20 MHz	0°C +70°C	SOP16
		×1		SPI	MR27V1641L-xxxMP	30 MHz	20 MHz	0°C +70°C	SOP16

Die Form Products				xxx denotes the ROM code number.				
Supply voltage	Memory density	Number of data bits	Function	Part No.	FAST READ	READ	Other features	Package
3.0V to 3.6V	64Mb	×1	SPI	MR27V6441L-xxxWA	33 MHz	20 MHz	0°C +70°C	Chip
			SPI	MR27V3241L-xxxWE	33 MHz	20 MHz	0°C +70°C	Chip
			SPI	MR27V1641L-xxxWA	30 MHz	20 MHz	0°C +70°C	Chip

Icon descriptions: SPI Function type, 20 MHz, 30 MHz, 33 MHz, 50 MHz, 86 MHz Operating frequency, 0°C, +70°C Operating Temperature, 7 SIZE, 7 SIZE Pad size

**Standard Packages** \*Actual size shown

I/O	×1bit	×2bit	×4bit
Density	16Mbit / 32Mbit / 64Mbit / 128Mbit		

Standard: 375mill 1.27mm pitch

## AS@P2ROM™ Series with Built-In Gate Array

**Customizable functionality and interface provides greater versatility**

AS@P2ROM™ incorporate a P2ROM™ core with a gate array on a single chip. Security functions can be added and the interface customized to meet set needs by gate array. The lineup includes medium speed and high speed types up to 1Gbit and 128Mbit, respectively.

Medium Speed Type (Die Forms Available)				x denotes product ID number.					
Supply voltage	Memory density	Gate array size	Function	Part No.	Number of input pins	Number of I/O pins	Random access	Page access	Package
3.0V to 3.6V	1Gb	30K	PAGE CMD	MR35V01G7xB	3 input	8 inout	tAC 920ns	tPA 320ns	TSOP(I)48
			NOR PAGE	MR35V5127xB	26 input	8 inout	tAC 240ns	tPA 25ns	TSOP(II)44
			PAGE CMD	MR35V2567xB	3 input	8 inout	tAC 920ns	tPA 320ns	TSOP(II)44

High Speed Type (Die Forms Available)				x denotes product ID number.					
Supply voltage	Memory density	Gate array size	Function	Part No.	Number of input pins	Number of I/O pins	Random access	Page access	Package
2.7V to 3.6V	128Mb	25K	NOR PAGE	MR25T1287xL	26 input	16 inout	tAC 80ns	tPA 25ns	TSOP(I)48
			NOR PAGE	MR25T647xL	26 input	16 inout	tAC 80ns	tPA 25ns	TSOP(II)44
	64Mb	25K	NOR PAGE	MR25T167xL	26 input	16 inout	tAC 70ns	tPA 25ns	TSOP(I)48
			NOR PAGE PW	MR25T1671L	26 input	16 inout	tAC 70ns	tPA 25ns	TSOP(II)44

Icon descriptions: NOR PAGE Function type, CMD Command control, PW Password authentication function, 3 input, 26 input Number of input only pins, 8 inout, 16 inout Number of input and output pins, tAC 70ns, tAC 80ns, tAC 240ns, tAC 920ns Access time, tPA 25ns, tPA 320ns Page access time

**Standard Packages** \*Actual size shown

I/O	×8bit / ×16bit	×8bit
Density	16Mbit / 64Mbit / 128Mbit / 1Gbit	16Mbit / 64Mbit / 128Mbit / 256Mbit / 512Mbit

Flat type: 12mm×20mm 0.5mm pitch

Flat type: 400mill 0.8mm pitch



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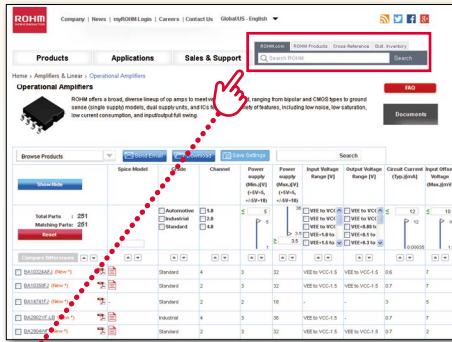
ROHM Semiconductor

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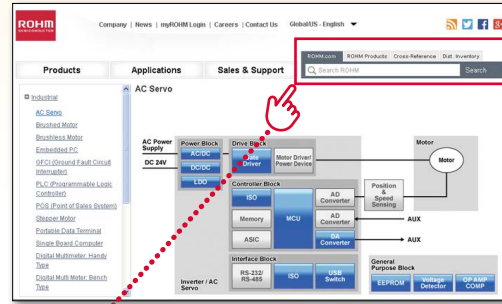
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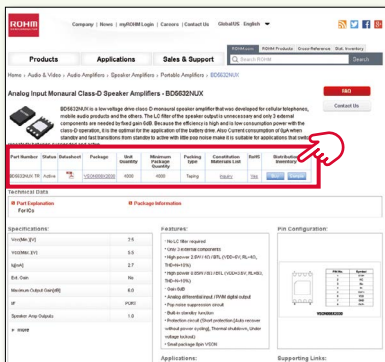
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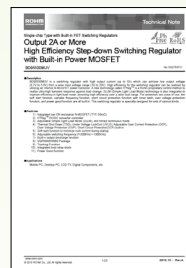
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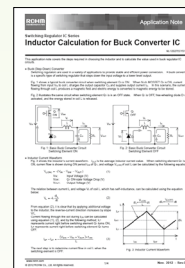
View



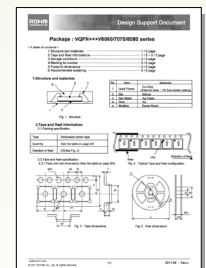
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Datasheets



Application Notes



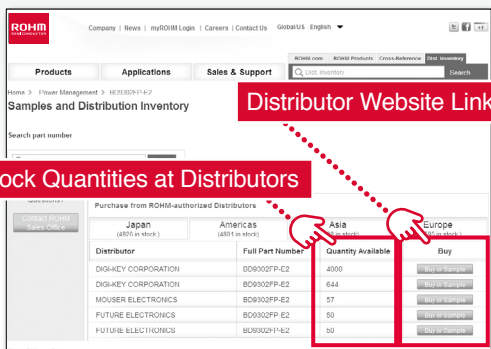
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Product Pages

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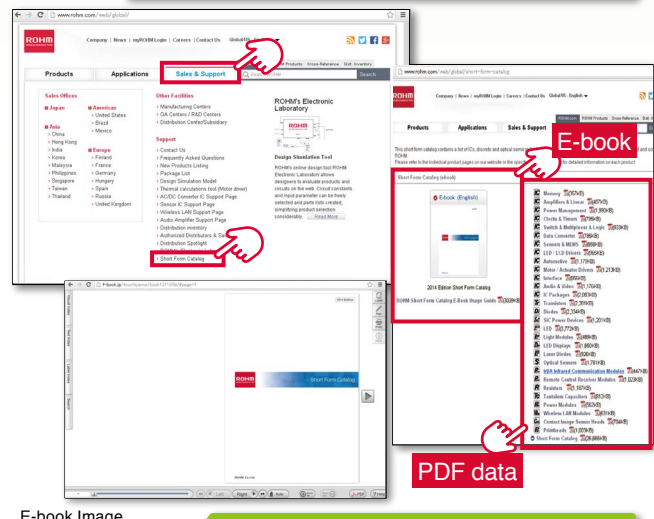
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LAPIS Semiconductor

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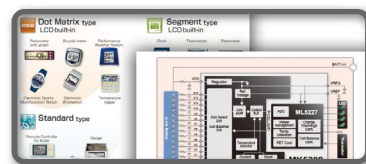
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### Brief and intelligible product description

**PDF** You can easily understand LAPIS Semiconductor's LSIs, modules, and development kits. You can download datasheet PDF files from the product list.

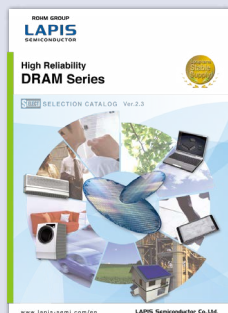


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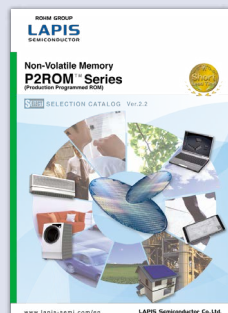
**Q** Parametric search makes easier for you to search microcomputer, DRAM and P2ROM™ products.

Products List				
	Part Number	UM	DS	Status ROM
1	ML610340			MP Mask
2	ML610346			MP Mask
3	ML610347			MP Mask
4	ML610401/ML610401P			MP Mask

### Selection Catalog \*Please contact the ROHM sales for more information.



DRAM



P2ROM™



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